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APPLICATION FOR LETTERS PATENT

FOR

**RETRACTABLE GAUGE STEP FOR FLEXIBLE
MULTI-DEPTH VENDING**

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RETRACTABLE GAUGE STEP FOR FLEXIBLE MULTI-DEPTH VENDING

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of provisional U.S. Application Serial No. 60/401,959, filed August 8, 2002, and titled "Retractable Gauge Step for Flexible Multi-Depth Vending," which is incorporated herein by reference in its entirety.

TECHNICAL FIELD OF THE INVENTION

[0002] This invention relates in general to the field of vending machines, and more particularly, to a system and method for dispensing products of various sizes from a product dispensing mechanism.

BACKGROUND OF THE INVENTION

[0003] Vending machines are widely used to dispense beverages, food, and other perishable and nonperishable goods. The products dispensed by vending machines come in various sizes. Thus, most common vending machines have been designed and built to accommodate the various product sizes. For example, a vending machine with a product holding stack that can accommodate rows of two bottles can be reconfigured to accommodate rows of four beverage cans (bottles are approximately twice as long as cans). For efficient operations, it is necessary to maximize the number of products that can be stored in the vending machine's product storage compartment, while minimizing the number of product dispensing mechanisms required to dispense the products of different sizes.

[0004] Generally, many vending machines, particularly those that dispense beverages, have column walls or partitions between which the individual bottles or cans and the like are stacked in a vertical column. At the bottom of each stack is a dispensing mechanism that dispenses a selected bottle or can after receipt of payment by the vending machine.

[0005] One type of dispensing mechanism is known as a bucket type mechanism. Bucket type dispensing mechanisms have a partial cylindrical shape that accommodates within it a row of bottles or cans that is positioned laterally relative to the length of the cylinder. A portion of the circumference of the cylinder, however, is open, therefore allowing the bottles or cans to enter into, and exit from the bucket at various stages of the vend cycle.

[0006] In operation, a motor or other rotational means rotates the bucket about its axis. A gauging device, appropriately located below the bucket, is used to create steps of various sizes, which generally correspond to the length of the individual cans or bottles being dispensed, i.e., the depth of the products. The opening in the bucket is of a sufficient size so that when rotated to a certain point, the first bottle or can is free to fall out of the bucket dispenser and into the product chute through which it is dispensed to the customer, while the next-to-vend bottle or can remains in the bucket, held by the next gauge step.

[0007] During subsequent vends, the bucket rotates to expose the next bottle or can, allowing it to fall. After all products have been dispensed from the bucket, the dispensing mechanism continues through the reload phase of the vend cycle whereby the next row of products enter the bucket in preparation for the subsequent vending cycles. Thus, products are initially seated within the bucket, and may be held in place by a gauging device, but are unseated and dispensed as the bucket rotates.

[0008] One of the goals for operating vending machines is to maximize the number of products that can be stored in the vending machine's product storage compartment, while minimizing the number of product dispensing mechanisms required to dispense the products of different sizes.

[0009] At present, common dispensing mechanisms require that some gauging components be added to or removed from the dispensing mechanisms themselves in order to accommodate variations in product sizes. Specifically, the configuration of the gauging portion of a product dispensing mechanism is altered by adding or removing various components. The addition or removal of specific gauging components creates a series of steps that generally correspond to the number of products that pass through the product dispensing mechanism during a complete vend cycle. As the product dispensing mechanism rotates through the vend cycle, openings through which

products drop are created to allow individual products to sequentially pass one at a time. Then, by controlling the rotation of the product dispensing mechanism and stopping its rotation at appropriate times during a vend cycle, the vending machine operates to allow only one product to be dispensed during each vend sequence.

[0010] One significant disadvantage of the current gauging devices arises from the fact that the gauging components are completely removable from the product dispensing mechanisms. Because they are removable, they are often misplaced or lost. Thus, the gauging components are often not available at the time they are needed to reconfigure a vending machine to dispense products of another size. As a result, delays occur when additional components must be ordered. Further, lost revenues occur when products of different sizes cannot be dispensed as intended. Such delays and lost revenues should be avoided in order to reach the desirable goals for efficient vending machine operations. Therefore, there is a need for an invention for gauging devices that do not cause the types of delays and costs described above.

SUMMARY OF THE INVENTION

[0011] It is an object of the present invention to provide an improved method and apparatus for product dispensing in a vending machine.

[0012] Another object of the present invention is to provide such a method and apparatus that do not require using removable parts to configure product dispensing mechanisms in order to dispense products of various sizes.

[0013] Another object of the present invention is to provide such a method and apparatus that eliminates costly delays and expenses associated with configuring product dispensing mechanisms to accommodate products of various sizes.

[0014] Thus, the present invention achieves these objects in a method and apparatus for dispensing products of various sizes from a product dispensing mechanism. The apparatus includes a motor driven product dispenser having a gauging device that allows multiple products to sequentially be freed one at a time in accordance with the amount of rotation that the product dispenser travels, a motor controller used to control the product dispenser drive motor, and a product delivery chute located below the product dispenser for receiving product as they are freed from the product dispenser and presented to the consumer. The gauging device is substantially permanently affixed to the product dispensing mechanism and is operable to be configured to accommodate products of various depths. Thus, the present invention eliminates use of removable components that may be misplaced or lost, resulting in undesirable delays and costs.

BRIEF DESCRIPTION OF THE DRAWINGS

- [0015] The description and figures herein describe exemplary embodiments of the present invention. A more complete understanding of the present embodiments and advantages thereof may be acquired by referring to the following description taken in conjunction with the accompanying drawings, in which like reference numbers indicate like features, and wherein:
- [0016] Figure 1 is a perspective view of a vending machine incorporating the disclosed invention;
- [0017] Figure 2 is a view of components of a product dispensing assembly according to the present disclosure;
- [0018] Figures 3A and 3B are perspective views of a portion of product dispensing assembly with the disclosed product gauge step;
- [0019] Figures 4A, 4B, and 4C are various views of the disclosed product gauge step; and
- [0020] Figure 4D is a detail of the detents used in one embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0021] Figure 1 shows the interior of a vending machine 100 having a housing 101 and a door 102 pivotally coupled to the housing. Within housing 101, products 108, such as bottles or cans, are stored vertically in channels 106 formed between successive partitions 104. Products are typically positioned laterally within the channel and stacked on top of one another to form one or more vertical columns as shown in Figure 1. A product dispensing chute 130 is positioned below the channel 106 to receive products 108 that are dispensed by a product dispensing assembly 200 (Figure 2) and to deliver products 108 to a location at which they can be retrieved by a customer through an aperture 132 in the vending machine door 102. A front panel 122 extends across the front side of the lower portion of partitions 104. Positioned behind front panel 122 are product dispensing assemblies 200 (Figure 2), which are controlled by controller 150.

[0022] Figure 2 shows the product dispensing assembly 200 used for dispensing products 108 after receipt of payment by the vending machine. Product dispensing assembly 200 includes a dispenser 205 that is positioned substantially horizontally at the bottom of the channel 106 and between partitions 104, and extends laterally along the channel. The dispenser 205 may extend substantially along the length of the channel, or along the portion of the channel in which products are stacked. The dispensing assembly 200 is mounted to front panel 122 and rear panel 223 such that it is rotatable. Guided by a retractable gauge step 250, products may be dispensed by the product dispensing assembly 200, which may be controlled by controller 150 to dispense products by the amount of rotation induced upon the dispenser 205 by the motor assembly 230.

[0023] Further, Figures 2, 3A and 3B show a retractable gauge step 250 that is substantially permanently affixed to the gauging portion at cutout slots 251 and 252 of the product dispensing mechanism 200. A pair of snaps are provided to act as detents 254 in the detent openings 264 in the gauging portion of the product dispensing mechanism 200. In one embodiment, the gauge step 250 is operable to move between two positions.

[0024] Figure 3A and 3B show the two exemplary positions. In the first position, as shown in Figure 3A, the gauge step 250 is extended whereby it creates a gauge step to support products in the product dispensing mechanism. In the second position, as shown in Figure 3B, the gauge step

is retracted when an additional gauge step is not needed for vending operations. In each position, detents 254 and detent openings 264 are used to hold the gauge step 250 securely in its proper place.

[0025] Figures 4A, 4B, and 4C show an embodiment of the gauge step that includes detents 254 whereby the gauge step can be secured in either the extended or retracted position during normal operations. The detents 254 serve to position and hold the gauge step 250 in relation to the gauging portion of the product dispensing mechanism, wherein the gauge step can be released by force applied to one of the detents 254, when necessary to reconfigure the product dispensing mechanism 200. In one embodiment, the gauge step 250 may be an injection molded plastic part that includes a series of hooks 253 that allow the gauge step 250 to be attached to a pair of cutout slots 251 and 252 in the gauging portion of the product dispensing mechanism 200. As shown in Figure 4D, a pair of snaps is provided to act as detents 254 in the detent openings 264 in the gauging portion of the product dispensing mechanism 200.

[0026] Thus, the present invention provides an apparatus whereby the gauging portion of a product dispensing mechanism in a vending machine can be easily configured to accommodate the depth and number of products being dispensed without adding or removing parts, as required by existing product dispensing mechanisms. The present invention provides a sliding gauge step that can be easily extended or retracted to create or eliminate a product gauge step. Thus, the present invention avoids the use of removable parts, which are required in existing vending machines, to configure product dispensing assemblies to vend an array of products.

[0027] The embodiments as described above may be adapted to accommodate one, two, three or more products within the product dispensing assembly at one time. It should therefore be understood that variations to the embodiments above are easily accomplished to accommodate variations in product sizes.

[0028] Although the present invention has been described in detail, it should be understood that various changes, substitutions and alterations can be made hereto without departing from the spirit and scope of the invention as defined by the appended claims.